

Applicants : Brent J. Bos et al.
For : INTERIOR REARVIEW MIRROR SYSTEM INCLUDING
A FORWARD FACING VIDEO DEVICE
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Amendments to the Specification:

After the Title and before the first line of the specification, please insert the following:

-- CROSS-REFERENCE TO RELATED APPLICATIONS

This is a continuation of U.S. pat. application, Ser. No. 10/011,517, filed Nov. 05, 2001 by Bos et al. for INTERIOR REARVIEW MIRROR SYSTEM INCLUDING A FORWARD FACING VIDEO DEVICE (Attorney Docket DON01 P-934), which is a continuation of U.S. pat. application, Ser. No. 09/346,352, filed Jul. 2, 1999 by Bos et al. for RAIN SENSOR, now U.S. Pat. No. 6,313,454 (Attorney Docket No. DON01 P-745); and a continuation-in-part of U.S. pat. application, Ser. No. 09/599,979, filed Jun. 22, 2000 by Schofield et al. for VEHICLE RAIN SENSOR USING IMAGING SENSOR, now U.S. Pat. No. 6,320,176 (Attorney Docket No. DON01 P-816), which is a continuation of U.S. pat. application, Ser. No. 09/135,565, filed on Aug. 17, 1998 for VEHICLE HEADLAMP CONTROL USING IMAGING SENSOR, now U.S. Pat. No. 6,097,023 (Attorney Docket No. DON01 P-699); and a continuation-in-part of U.S. pat. application, Ser. No. 09/776,625, filed Feb. 5, 2001 by Schofield et al. for VEHICLE CAMERA DISPLAY SYSTEM, now U.S. Pat. No. 6,611,202 (Attorney Docket No. DON01 P-874), which is a continuation of U.S. pat. application, Ser. No. 09/313,139, filed May 17, 1999 for REARVIEW VISION SYSTEM WITH INDICIA OF BACKUP TRAVEL, now U.S. Pat. No. 6,222,447 (Attorney Docket No. DON01 P-751), which is a continuation of U.S. pat. application, Ser. No. 08/935,336, filed Sep. 22, 1997 for DISPLAY ENHANCEMENTS FOR VEHICLE VISION SYSTEM, now U.S. Pat. No. 5,949,331 (Attorney Docket No. DON01 P-680); and a continuation-in-part of U.S. pat. application, Ser. No. 09/530,306, filed Apr. 27, 2000 by Schofield et al. for RAIN SENSOR WITH FOG DISCRIMINATION, now U.S. Pat. No. 6,353,392 (Attorney Docket No. DON01 P-708A), which is a 371 national phase application of International PCT Application No. PCT/US98/23062, filed Oct. 30, 1998 (Attorney Docket No. DON01 FP-708(PCT)), which claims priority on U.S. provisional application, Ser. No. 60/064,335, filed Oct. 30, 1997, which are all hereby incorporated herein by reference in their entireties. --

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Please amend the paragraph beginning at line 1 of page 6 as follows:

-- Rain sensor system 16 of the present invention includes an illumination sensor or detector 36, which is preferably a multi-element, electro-optic, pixelated imaging array sensor, such as a CMOS imaging array, CCD imaging array sensor or the like, a detailed description of which is disclosed in commonly assigned United States Patent 5,670,935, issued to Schofield et al., co-pending patent application, Serial Number 09/313,139, filed on May 17, 1999, now U.S. Pat. No. 6,222,447, which is a continuation of application Serial Number 08/935,336, filed on September 22, 1997, now U.S. Pat. No. 5,949,331, which is a continuation of the Schofield '935 patent, the disclosures of which are hereby incorporated herein by reference. --

Please amend the paragraph beginning at line 9 of page 6 as follows:

-- Rain sensor 16 preferably includes a smoothing algorithm or filter 35 which processes data sampled by illumination detector 36 in order to account for irregularities of the window. Such irregularities are predominately surface irregularities such as pits and/or scratches, which may be present in sampling area 48. Other irregularities may include internal irregularities such as antenna and other insets in the glass, as well as lamination defects and the like. By mounting rain sensor system 16 in a rear view mirror bracket such that illumination detector 36 is directed toward the front of the vehicle, rain sensor system 16 may be adapted to also operate as a head lamp controller, as disclosed in commonly assigned United States Patent 5,796,094 issued to Schofield et al., and co-pending patent application, Serial Number 09/135,565, filed August 17, 1998, now U.S. Pat. No. 6,097,023, which is a continuation of the Schofield '094 patent, the disclosures of which are hereby incorporated herein by reference. Furthermore, illumination detector 36 may be adapted to function as a component of an active cruise control system, whereby the detector functions to determine the speed at which the vehicle is travelling. Alternatively, if the rain sensor system disclosed herein were mounted such that illumination detector 36 were facing rearward, toward rear window 20 of vehicle 18, illumination detector 36 may be adapted to function as a component

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window 20 of vehicle 18, illumination detector 36 may be adapted to function as a component of a vehicle back-up aid system. It is further envisioned that the smoothing algorithm of the present invention may be applied to other vehicular vision or control systems, such as a wide angle image capture system of the type disclosed in commonly assigned United States Patent application, Serial Number 09/199,907, filed on November 25, 1998 by Brent J. Bos et al., now U.S. Pat. No. 6,717,610, or a vision system of types disclosed in above referenced United States Patent 5,670,935 and in commonly assigned United States Patent 5,550,677, issued to Schofield et al., the disclosures of which are hereby incorporated herein by reference. --

Please amend the paragraph beginning at line 23 of page 14 as follows:

-- Although edge detection function 44 detects and calculates the number of edges 56 and 58 of precipitation droplets 57, window 19 will typically include many other marks associated with scratches, pits, defects or the like and detected by imaging array sensor 36. Referring now to Figs. 14 to 18, a simulation is shown of a typical sampling area as detected by sensor 36 when illumination source 38 is activated. As discussed above ~~and simulated in Fig. 14~~, rain droplets 57 appear as light rings on a dark background. The rain droplets 57 are simulated in Figs. 14-18 as dark rings or dots on a light or white background. However, as shown in Fig. 15, a typical sampling area 48 provides images associated with the precipitation droplets 57 along with a high number of other signals, typically associated with irregularities of window 19, such as pits or scratches on the window surface, which are represented by the smaller ~~white~~ dots 61. Without any smoothing algorithm or filter process, edge detection function 44 would count each signal received as a rain droplet, thereby resulting in a substantial error in the number of droplets on window 19 determined by edge detection function 44. For example, the simulated sampling area of Fig. 15 results in a count of approximately 10,000 edges or droplets, when an accurate count of only the rain droplet edges (Fig. 14) should have resulted in a count of only approximately 2500 edges. --

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Amendments to the Abstract:

Please amend the Abstract on page 41 as follows:

An interior rearview mirror system includes an interior rearview mirror assembly, electronic circuitry, an imaging sensor, a rain sensor control and a headlamp control. The electronic circuitry is operable to control an electrochromic reflective element of the mirror assembly. The imaging sensor is positioned with a field of view through a window of the vehicle. The rain sensor control is responsive to an output signal of the imaging sensor and controls a windshield wiper of the vehicle and/or a defogging system of the vehicle in response to the output signal. The headlamp control is responsive to an output signal of the imaging sensor and controls a headlamp of the vehicle in response to the output signal. The rain sensor control and the headlamp control at least one of (a) access a common component of the electronic circuitry, and (b) share a common component of the electronic circuitry. A vehicular rain sensor system for detecting precipitation on an exterior surface of a window including a illumination sensor that is decoupled from the window. The illumination sensor is preferably an imaging array sensor which communicates a signal to a control which further determines whether rain is present on the window. The control preferably includes an edge detection function for detecting edges of precipitation droplets on the window and activating the windshield wipers of the vehicle when the number of edges detected exceeds a predetermined threshold value. A smoothing algorithm or filter is provided to account for surface irregularities on the window, thereby substantially precluding such irregularities from being erroneously detected as rain droplets by the edge detection function. The rain sensor system may further include a polarizing filter and an illumination source, such that the rain sensor system may not only prevent false signals of rain when only fog is present on an interior surface of the window, but also allows the rain sensor system to actually detect fog particles on an interior surface of the window, thereby allowing the control to further be connected to a ventilation blower within the vehicle for the purpose of activating the blower to eliminate the fog.

A new Abstract sheet is attached.